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CHIEF SCIENTIFIC ADVISER

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IRAQ – MORTALITY AFTER THE 2003 INVASION OF IRAQ: A CROSS-SECTIONAL CLUSTER SAMPLE SURVEY – LANCET OCTOBER 2006

1. Further to our discussions yesterday, CSA has reviewed the recent article by Burnham and colleagues published in the *Lancet* (Online – 11 October 2006) and received comments from an independent expert in statistical epidemiology and demography (Professor Christl Donnelly, Imperial College). He has the following comments to make:
 - a) The study design is robust and employs methods that are regarded as close to 'best practice' in this area, given the difficulties of data collection and verification in the present circumstances in Iraq. The methods section of the paper is sufficiently detailed to gain a good impression of the techniques adopted, problems encountered in implementation and the statistical methods employed in analysis. The methods are an improvement on those used in the 2004 *Lancet* article by the same senior author (G Burnham). Sample sizes have been increased, given critical comment on the earlier study with respect to small sample size (and the concomitant large confidence intervals surrounding estimates of excess mortality) and previous lack of verification of reported death against death certificates. The senior author is a competent researcher in public health and demography and the study received appropriate scrutiny from the sponsoring institutions in the USA and Iraq.
 - b) The most significant improvement in methodology between the 2004 and 2006 studies lie in death certificate verification of reported mortality, larger

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sample sizes and better design in the cross-sectional (by age and gender) cluster-based survey methods.

- c) The reported analyses and statistical methods employed seem robust, although moderate confidence bounds remain on the estimate of 601,027 post-invasion deaths due to violence (95% confidence bound of 426,369 to 793,663). This is in part a consequence of heterogeneity between clusters and extrapolation from samples to the total population. In the difficult circumstances surrounding data collection this is hardly surprising. The average estimate in the 2006 study is close to that reported in the 2004 study.
 - d) Deaths were much more prevalent among adolescent to middle aged men and bias may remain with respect to average levels of non-combatant mortality in the overall population, given that some of the recorded deaths were amongst combatants against both the coalition forces and opposing sectarian groups.
 - e) The discussion section of the 2006 paper is more balanced than that in the 2004 study, with reasonable discussion of problems in data collection plus study implementation, and the interpretation of the reported estimates.
2. Further assessment has also been provided by the same Dstl analyst (and reviewed by Dstl's Chief Scientist) who provided assessment for the 2004 Lancet study, which broadly supports CSA's main conclusions.
3. Given the reasonably robust study design and appropriate analysis methods, CSA recommends caution in publicly criticising the study.

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